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Great Plains Studies, Center for

2008

**Review of *Handbook of Forage and Rangeland Insects*. Edited by
William O. Lamp, Richard C. Berberet, Leon G. Higley, and Craig R.
Baird. Lanham**

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McPherson, J. E., "Review of *Handbook of Forage and Rangeland Insects*. Edited by William O. Lamp, Richard C. Berberet, Leon G. Higley, and Craig R. Baird. Lanham" (2008). *Great Plains Research: A Journal of Natural and Social Sciences*. 942.

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Handbook of Forage and Rangeland Insects. Edited by William O. Lamp, Richard C. Berberet, Leon G. Higley, and Craig R. Baird. Lanham, MD: Entomological Society of America, 2007. vi + 180 pp. Photographs, figures, maps, tables, references, glossary, index. \$59.00 paper.

This handbook is another in the outstanding series published by the Entomological Society of America, now in cooperation with the American Phytopathological Society. Arranged in four sections—"Forage and Rangeland Production," "Arthropods and Their Management," "Injurious Arthropods," and "Beneficial Organisms"—each of these is divided into clearly delineated subsections, allowing readers easy access to information (along with references) that particularly interests them. The text is accompanied by outstanding color photographs throughout.

"Forage and Rangeland Production" includes a forage production history followed by discussions of North America's important legumes and grasses. Along with detailed tables of both groups' major species and their characteristics (e.g., longevity, palatability, winter hardiness, geographic distribution), there are surveys of several of these species, the ecology and physiology of forage crops, and information on production practices. Well written and easily understood, the section emphasizes that a particular species chosen for production in various geographical areas must be governed by an understanding of the environmental conditions under which the plants will be grown.

"Arthropods and Their Management" offers a review of injuries caused by arthropod pests, including host plant resistance, biological control, cultural control, and pesticides, as well as information on sampling, influence of weather on pest populations, pest movement and migration, and management decision making. A table listing types of damage and the possible insect pests causing

them precedes an interesting key to some common invertebrates in forage and rangeland crops. Unfortunately, there are two problems with the key, not including the figure of a harvestman with only seven legs (couplet #7). First, in couplet #5 ("With distinct head, segmented legs on thorax . . ."), the listed groups include white grubs and stem borers. But also included are weevil larvae, which are legless. Second, in couplet #22 ("Lives in spittle [white foam] mass on plant"), an adult spittle bug is shown, although spittle is produced only by nymphs.

The informative "Injurious Arthropods" section, accompanied by a table listing the common groups of injurious taxa that feed on forage and rangeland crops, opens with a discussion of the difficulty in categorizing certain arthropods as causing only one type of damage because their feeding habits overlap various categories. A detailed consideration of several of these pests is also included, as well as geographical distributions, life cycles, injury, and management.

Although not so important as to affect the meaning of the text, several errors, taken as a group, are disconcerting. For example, the paragraph dealing with the Packard grasshopper on p. 71 concludes with a description of the nymph and refers readers to Figure 12, a photograph of an *adult* Packard grasshopper. Between Figures 11 and 12 is a photograph of a winged grasshopper that lacks a legend. Although we are told on p. 76 that "Planthoppers have a large flattened spur at the end of the hind tibiae," only one family (Delphacidae) has the spur. And on p. 120, the scientific name for the clover root borer erroneously appears as *Hylastinus obscuru* when it should be *Hylastinus obscurus*. Despite these and other errors, the section does provide excellent information overall.

The "Beneficial Organisms" section provides an outstanding summary of what must have been a difficult undertaking because of the biology and wide-ranging nature of the organisms discussed. There are three subsections dealing with natural enemies, both invertebrates (i.e., dipteran and hymenopteran parasitoids, coleopteran and heteropteran predators, spiders) and entomopathogens (i.e., viruses, bacteria, protozoans, microsporidians, fungi, and nematodes); pollinators (i.e., bees); and biological control agents of weeds. Several groups are discussed in detail, but because the authors deal with few specific taxa, few distribution maps are provided (coccinellids are an exception).

As would be expected, the invertebrates and entomopathogens are handled separately. For the invertebrates, a summary table is presented that lists the taxa at the family level and includes general notes about their prey. A summary table for the entomopathogens contains

additional notes on symptoms resulting from infection. Both tables are excellent. The biology of several taxa for the two groups is discussed in the text, offering readers an appreciation of the importance of these organisms in suppressing the populations of arthropod pests.

The only pollinators mentioned, and only briefly, are alfalfa leafcutter bees, alkali bees, and honey bees. General information on the importance of these taxa and their biology is provided, but information on their economic importance is limited.

The final subsection on biological control agents for weeds is, for the most part, first rate. A summary table includes for each weed its natural enemies and places of origin, the part(s) of the plant attacked, where each control agent has become established in North America, and a brief morphological description. The accompanying text offers expanded discussions of the table information.

Nonetheless, there are several errors. For example, on page 137 (left column) the tarsal formulae for the Coccinellidae and Chrysomelidae are given as 3 tarsal segments vs. 4, respectively, when, in fact, they are "apparently" 3,3,3 and 4,4,4. Under stink bugs (p. 145), *Apateticus* is now *Apoecilus* for the two most common species. Also, *Brochymena* is phytophagous, not predaceous. In the text (p. 151), Figure 6 refers to *Antonospora locustae*, but the legend for this figure refers to *Zoophthora phytonomi*. On page 152 of the Microsporidia section, the organism discussed is first listed as *Antonospora* (*Paranosema*/*Nosema*) *locustae*, then, in sequence, *A. locustae*, *N. locustae*, and *A. locustae*. Which is correct?

This handbook, including its useful glossary, is remarkable in its broad coverage of forage and rangeland insects and related topics, such as crop production. It will be of value to specialists wishing to broaden their knowledge of areas outside but related to their specialties. Although I cannot recommend it unconditionally because of its bothersome errors, I look forward to praising a revised and corrected edition enthusiastically. **J.E. McPherson**, Department of Zoology, Southern Illinois University, Carbondale.